

Name _____
Period ____ Date ____

Reaction Rates, Endo and Exothermic Reactions

Kinetic energy- **MOVING ENERGY - BASED ON MASS AND VELOCITY**

Rate of reaction- **THE SPEED OF A REACTION**

[NOTE: AS REACTION RATE \uparrow TIME OF REACTION \downarrow & VICE VERSA]

Collision theory- **MOLECULES MUST COLLIDE TO REACT. IF PARTICLES COLLIDE WITH LESS ENERGY THAN THE ACTIVATION ENERGY, THEY WILL NOT REACT. THE PARTICLES WILL JUST BOUNCE OFF OF EACH OTHER. THEY ALSO MUST**

Activation energy-

THE MINIMUM AMOUNT OF ENERGY FOR PARTICLES TO REACT - IS DIFFERENT FOR EACH REACTION

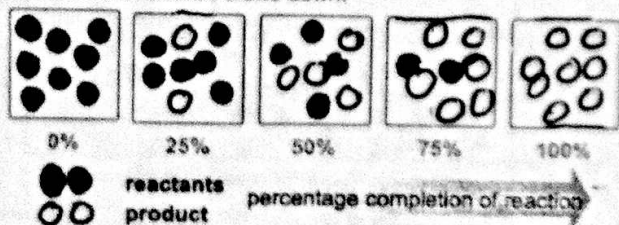
BE IN THE CORRECT ORIENTATION TO REACT

Anything that CHANGES the number of successful collisions between reactant particles will SPEED up a reaction. These things include:

- Increased TEMPERATURE
- INCREASED CONCENTRATION of dissolved reactants
- Increased SURFACE AREA of solid reactants
- Use of CATALYST

Reactions do not proceed at a steady rate. They start off at a certain speed, then get slower and slower until they stop.

This reduces the frequency of collisions between particles and so the reaction slows down.



Measuring the rate of a reaction means measuring: **THE CHANGE IN THE AMOUNT OF A REACTANT OR AMOUNT OF PRODUCT**

Temperature:

AT A HIGHER TEMPERATURE PARTICLES HAVE MORE ENERGY - THIS MEANS THEY MOVE FASTER AND ARE MORE LIKELY TO COLLIDE WITH OTHER PARTICLES - WHEN THEY COLLIDE THEY DO SO WITH MORE ENERGY WHICH ALSO INCREASES THE # OF SUCCESSFUL COLLISIONS

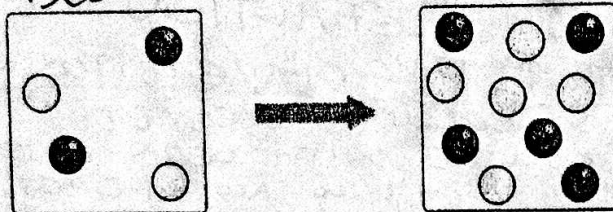
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CONCENTRATION - THE # OF MOLECULES IN A GIVEN VOLUME

Concentration: AT A HIGHER CONCENTRATION, THERE ARE MORE PARTICLES IN THE SAME AMOUNT OF SPACE WHICH INCREASES THE CHANCE OF COLLISION AND THAT GIVES THE PARTICLES A GREATER CHANCE TO REACT

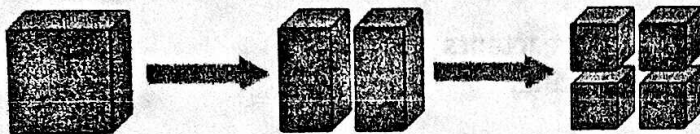


lower concentration

higher concentration

Surface Area: THE TOTAL AREA OF AN OBJECT'S FACES

If the solid is split into several pieces, the surface area increases. What effect will this have on rate of reaction?

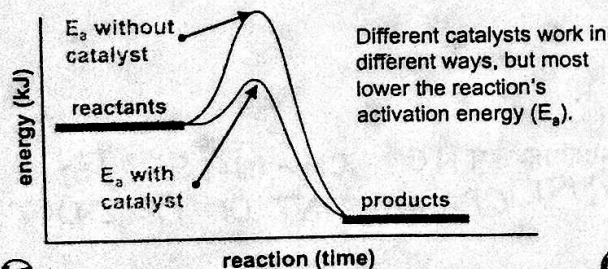


low surface area

high surface area

The SMALLER the pieces, the LARGER the surface area. This means more collisions and a greater chance of reaction.

Catalysts: ARE SUBSTANCES THAT CHANGE THE RATE OF A REACTION WITHOUT BEING USED UP IN THE REACTION



Why are catalysts so important in industry??

LOWER PRODUCTION COSTS, LOWER PROCESSING TIME AND LOWER WASTE/POLLUTION

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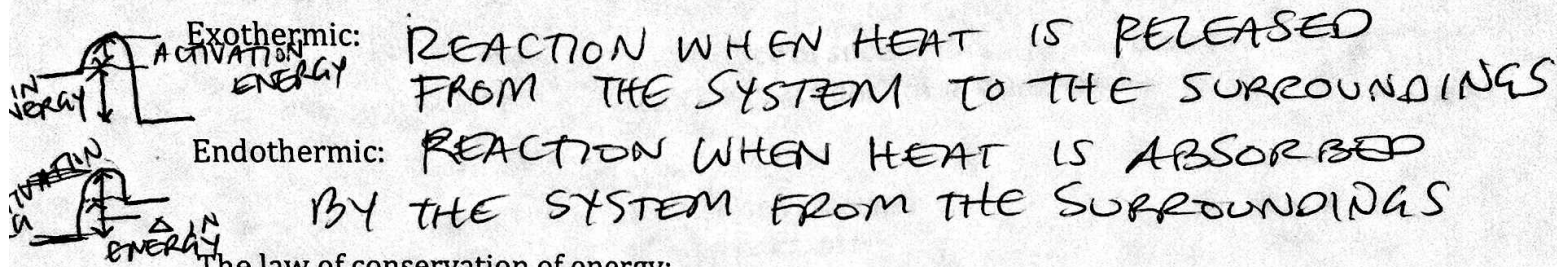
Energy in reactions

All chemical reactions involve bond breaking and bond forming

To Break Bonds- ENERGY IS ABSORBED / REQUIRED

When bonds are formed- ENERGY IS RELEASED

Chemical reactions are accompanied by a CHANGE in energy, mainly in the form of HEAT



The law of conservation of energy:

ENERGY CANNOT BE CREATED OR DESTROYED ONLY TRANSFORMED

	Endothermic	Exothermic
Description	absorb energy	RELEASE IN ENERGY
Clues	GROWING, MELTING, BOILING, ANYTHING THAT MAKES SURROUNDINGS COOLER	burning, exploding, freezing, condensing, sound released, makes surroundings warmer
Examples	water boiling, person sweating, ice melting	FIRECRACKER, VOLCANO ERUPTING, MAKING ICE CUBES

HEAT FROM THE BODY ALLOWS FOR LIQUID TO EVAPORATE

Temperature: RELATES TO THE AVERAGE KINETIC ENERGY OF ATOMS IN THE MATERIAL

Heat: TRANSFER OF ENERGY [FROM HIGH TO LOW, WARM TO COLD]

Thermal energy: TOTAL KINETIC ENERGY RESULTING FROM MOVEMENT OF ATOMS